

-2-

AMENDMENTS TO THE CLAIMS

1-2. (Canceled)

3. (Currently amended) A system comprising:

an operating area closed to ambient light, the operating area including a surgical field where ~~[[a]]~~ an open surgical procedure may be performed on a subject;

a visible light source capable of illuminating the surgical field, the visible light source providing a range of wavelengths including one or more wavelengths of visible light, and the visible light source further capable of providing conventional lighting for the surgical field;

an excitation light source capable of illuminating the surgical field, the excitation light source including at least one wavelength outside the range of wavelengths of visible light;

a fluorescent substance suitable for in vivo use, the fluorescent substance fluorescing at an emission wavelength in response to the at least one wavelength of the excitation light source, the fluorescent substance being introduced into the surgical field;

an electronic imaging device ~~that captures~~ positioned to capture a visible light image of the surgical field and an emission wavelength image of the surgical field, the electronic imaging device disposed away from the surgical field and adapted to capture images propagating through free space between the surgical field and the electronic imaging device; and

a display that renders the visible light image and the emission wavelength image of the surgical field, the emission wavelength image being displayed at a visible light wavelength.

4. (Canceled)

5. (Currently amended) The system ~~of any of claim 1, 2, 3, or 4~~ 3 wherein the one or more wavelengths of visible light from the visible light source does not include far-red light, and wherein at least one of the excitation light source and the emission wavelength includes a far-red light wavelength.

6. (Canceled)

7. (Currently amended) The system of ~~any of claims 1 through 6~~ claim 3 further comprising a ~~second~~ filter that separates the emission wavelength from the range of wavelengths from the visible light source, the emission wavelength being directed toward a first optical transducer of the electronic imaging device and the range of wavelengths from the visible light source being directed toward a second optical transducer of the electronic imaging device.

8. (Currently amended) The system of ~~any of claims 1 through 6~~ further comprising a ~~second filter that separates the emission wavelength from the range of wavelengths from the visible light source, the emission wavelength being directed toward a first optical transducer of the electronic imaging device and the range of wavelengths from the visible light source being directed toward a second optical transducer of the electronic imaging device~~ claim 7 wherein the second optical transducer separately senses at least each one of red, green, and blue light intensities.

9. (Currently amended) The system of ~~any of claims 1 through 6~~ further comprising a ~~second filter that separates the emission wavelength from the range of wavelengths from the visible light source, the emission wavelength being directed toward a first optical transducer of the electronic imaging device and the range of wavelengths from the visible light source being directed toward a second optical transducer of the electronic imaging device~~ claim 7 wherein the second optical transducer separately senses at least each one of cyan, magenta, and yellow light intensities.

10. (Currently amended) The system of ~~any of claims 1 through 6~~ further comprising a ~~second filter that separates the emission wavelength from the range of wavelengths from the visible light source, the emission wavelength being directed toward a first optical transducer of the electronic imaging device and the range of wavelengths from the visible light source being directed toward a second optical transducer of the electronic imaging device~~ claim 7 wherein the ~~second~~ filter includes a dichroic mirror that reflects the emission wavelength and transmits the one or more wavelengths of visible light from the visible light source.

11. (Currently amended) The system of ~~any of claims 1 through 6~~ further comprising a second filter that separates the emission wavelength from the range of wavelengths from the visible light source, the emission wavelength being directed toward a first optical transducer of the electronic imaging device and the range of wavelengths from the visible light source being directed toward a second optical transducer of the electronic imaging device claim 7 wherein the second filter includes a dichroic mirror that reflects the one or more wavelengths of visible light from the visible light source and transmits the emission wavelength.

12. (Currently amended) The system of ~~any of claims 1 through 6~~ claim 7 further comprising a second filter that shapes the wavelengths of the visible light source.

13. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device includes at least one charge-coupled device.

14. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device includes a video camera sensitive to visible light.

15. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device includes an emission wavelength camera.

16. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device captures a visible light image and an emission wavelength image, the system further comprising a processor that converts the emission wavelength image to a converted image having one or more visible light components, and combines the converted image with the visible light image for display.

17. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device captures a visible light image and an emission wavelength image, the system further comprising a processor that converts the emission wavelength image to a

converted image having one or more visible light components, and superimposes the converted image onto the visible light image for display.

18. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device captures a visible light image and an emission wavelength image, and wherein the visible light image is captured at thirty frames per second and the emission wavelength is captured at fifteen frames per second, the emission wavelength being converted to thirty frames per second for combination with the visible light image.

19. (Currently amended) The system of ~~any of claims 1 through 12~~ claim 3 wherein the electronic imaging device captures a visible light image and an emission wavelength image, and wherein the visible light image is captured at thirty frames per second and the emission wavelength is captured at fifteen frames per second, the visible light image being converted to fifteen frames per second for combination with the emission wavelength image.

20. (Currently amended) The system of ~~any of claims 1 through 19~~ claim 3 wherein the excitation light source includes a laser.

21. (Currently amended) The system of ~~any of claims 1 through 19~~ claim 3 further comprising a display that displays images captured by the electronic imaging device.

22. (Currently amended) The system of ~~any of claims 1 through 21~~ claim 3 wherein the fluorescent substance labels at least one of an antibody, an antibody fragment, or a low-molecular-weight ligand that accumulates at a lesion, the system being used to visualize the lesion.

23. (Currently amended) The system of ~~any of claims 1 through 21~~ claim 3 wherein the fluorescent substance is soluble in blood, the system being used to visualize a blood system.

24. (Cancelled)

25. (Currently amended) The system of ~~any of claims 1 through 24~~ claim 3 wherein the fluorescent substance is a fluorescent dye injected into the subject by an intravenous injection.

26. (Currently amended) The system of ~~any of claims 1 through 24~~ claim 3 wherein the fluorescent substance is sprayed onto the subject.

27. (Currently amended) The system of ~~any of claims 1 through 21~~ claim 3 wherein the fluorescent substance is one or more quantum dots.

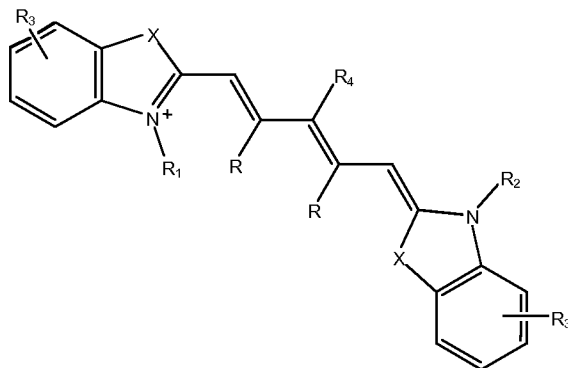
28. (Currently amended) The system of ~~any of claims 2, 3, or 5 through 21~~ claim 3 wherein the display is provided to a physician for use during a procedure, the procedure being at least one of a diagnostic procedure or a therapeutic procedure.

29. (Currently amended) The system of ~~any of claims 2, 3, or 5 through 21~~ claim 3 wherein the display includes a surgical microscope.

30. (Currently amended) The system of ~~any of claims 1 through 26~~ claim 3 wherein the fluorescent substance includes at least one of indocyanine green; fluorescein; methylene blue, and IRDye78-CA.

-7-

31. (Currently amended) The system of ~~any of claims 1 through 21~~ claim 3 wherein the fluorescent substance is a dye having a structure of the formula:



wherein, as valence and stability permit,

X represents C(R)₂, S, Se, O, or NR₅;

R represents H or lower alkyl, or two occurrences of R, taken together, form a ring together with the carbon atoms through which they are connected;

R₁ and R₂ represent, independently, substituted or unsubstituted lower alkyl, lower alkenyl, cycloalkyl, cycloalkylalkyl, aryl, or aralkyl;

R₃ represents, independently for each occurrence, one or more substituents to the ring to which it is attached;

R₄ represents H, halogen, or a substituted or unsubstituted ether or thioether of phenol or thiophenol; and

R₅ represents, independently for each occurrence, substituted or unsubstituted lower alkyl, cycloalkyl, cycloalkylalkyl, aryl, or aralkyl.

32-33. (Canceled)

-8-

34. (Currently amended) A method comprising:
- enclosing a subject of an open surgical procedure in an operating area closed to ambient light;
 - illuminating the subject with one or more wavelengths of visible light;
 - concurrently illuminating the subject with an excitation wavelength that is not one of the one or more wavelengths of visible light;
 - introducing a fluorescent substance into the subject, the fluorescent substance emitting photons at an emission wavelength in response to the excitation wavelength;
 - electronically capturing a visible light image of the subject;
 - electronically capturing an emission wavelength image of the subject; and
 - displaying concurrently the visible light image and the emission wavelength.

35-38. (Canceled)